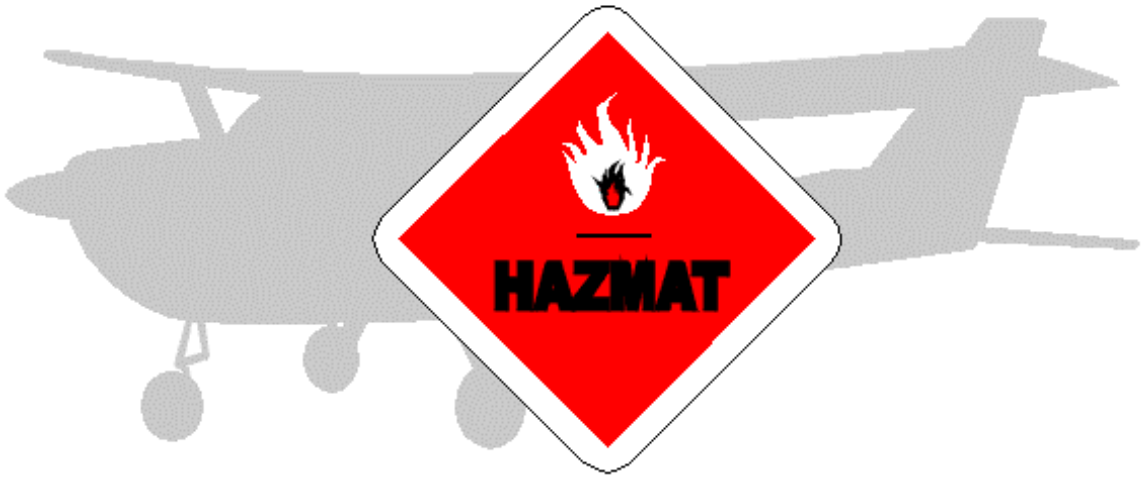
INTERAGENCY

Aviation Transport of Hazardous Materials



Department of the Interior
Handbook

Department of Agriculture - Forest Service
Guide

FOREWORD

This document, as authorized in FSM 5700 and 350 DM 2, establishes the USDA-Forest Service (FS) and the Department of the Interior (DOI) interagency aviation transport of hazardous materials program. This document further sets forth the objectives, policies, and standards for the transport of hazardous materials in aircraft under the exclusive direction and control of the FS or DOI.

Questions regarding this program should be directed to the FS National Aviation Officer or to Office of Aircraft Services (OAS) Regional or Area Offices. Additional copies of this document may be ordered from: National Interagency Fire Center, Great Basin Cache Supply Office, 3833 S. Development Ave., Boise, Idaho. This handbook is also available on the OAS website at: www.oas.gov.

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Director, OAS

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Director, Fire and Aviation Management, USDA-FS

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1.1 **Objective**. The objective of the aviation transport of hazardous materials program is to ensure the safety of flight when transporting hazardous materials by aircraft under the exclusive direction of the FS or DOI. FS and OAS will provide:

A. Technical advice on hazardous materials, handling procedures, and air transportation methods.

B. Technical training in the handling, storage, dispensing, and transportation of hazardous materials.

C. Information on new innovations and procedures to transport hazardous materials.

1.2 **Policy.** To enhance safety, all personnel responsible for transporting hazardous materials by aircraft shall, as a minimum, adhere to the procedures and standards prescribed herein.

1.3 **Applicability**. The procedures established in this document will be utilized only in the support of FS and DOI operations involving aircraft under the exclusive direction and control of FS or DOI. Other modes of transportation, aircraft not under the exclusive direction and control of FS or DOI, and hazardous materials not specified in this document, must comply with 49 CFR Parts 171-180.

Personnel who are essential for accomplishment of the project or mission (fire suppression, search and rescue, etc.) are allowed to be aboard a "Cargo Aircraft Only" while transporting hazardous material.

1.4 **Hazardous Materials Mishap Notification**. Notify the FS Regional Aviation Officer or the OAS Safety Office, by the most expeditious means available, when:

A. A mishap occurs involving damage or injury as a result of hazardous materials, including air transport, ground handling, or temporary storage, or;

B. If, in the opinion of any employee, a situation exists which could result in damage or injury as a result of hazardous materials.

1.5 **Deviations**. Request for deviations from this program should be addressed to the Chief, USDA-Forest Service or the Director, Office of Aircraft Services.

1.6 **Pilot-In-Command**. The assigned pilot-in-command is directly responsible and is the final authority for the operation of that aircraft.

1.7 **Definitions**. Terms most often used in the handling of hazardous materials are listed in Appendix 1 of this handbook.

1.8 **Abbreviations**. Abbreviations used in this handbook are contained in Appendix 2.

CAUTION: This document applies only to aircraft under the exclusive direction and control of DOI or FS. Commercial operations must comply with 49 CFR 175.

2.1 **Hazardous Materials Table**. A hazardous material is a substance or material, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety and property when transported in commerce. Known hazardous materials are listed in the Hazardous Materials Table (49 CFR, Part 172.101).

2.2 **Hazard Identification Aids**. Information on the contents of a product suspected of containing hazardous materials can be obtained by contacting the manufacturer of the product and requesting a Material Safety Data Sheet. If a product is suspected of containing hazardous materials, it must be identified before being transported.

3.1 **Limiting Exposure**. Personnel should minimize the hazards associated with transporting hazardous materials by:

A. Carrying hazardous materials aboard aircraft only when other means of transportation are impractical.

B. Limiting personnel on aircraft carrying hazardous materials to those essential to mission accomplishment.

C. Using external compartments or external loading for hazardous materials whenever possible.

D. Avoiding hazardous materials flights over congested areas.

E. Transporting hazardous materials in aircraft cabins only when essential to mission accomplishment.

3.2 **Packaging**. Packages containing hazardous materials must not leak or allow the contents to come in contact with the aircraft or personnel. Packages must be inspected for damage or leaks during loading and unloading. Packages found damaged or leaking must not be placed aboard aircraft. Damaged or leaking packages discovered aboard aircraft should be handled only as necessary to minimize further damage or injury and reported in accordance with paragraph 1.4.

3.3 **Securing of Packages**. Packages placed in aircraft or external cargo racks must be restrained from movement while in transit.

3.4 **Incompatible Hazardous Materials**. Hazardous materials which might react dangerously with one another must be segregated using separate flights, separate compartments, or separate packaging that prevents the interaction of the two materials.

3.5 **Notifying Pilot of Hazardous Materials**. The pilot and all personnel aboard an aircraft must be made aware of the location and type of hazardous materials being transported with them. The pilot shall ensure that all personnel are briefed as to what specific actions are required in the event of an emergency. The pilot must be given initial written notification of the type, quantity, and the location of hazardous materials placed aboard the aircraft before the start of any project. Thereafter, verbal notification before each flight is acceptable. For operations where the type and quantity of the materials do not change, such as aerial ignition projects, repeated notification will not be required.

3.6 **Ignition Sources**. Smoking or the use of any item that could cause an open flame or spark are prohibited when explosives, flammable solids, flammable liquids, or gases are being loaded and unloaded, or during flight.

3.7 **Training Requirements**. Training in the proper handling of a hazardous material must be given to each person who loads or unloads hazardous materials on aircraft. Training must include the requirements and conditions of this exemption and the training required by 49 CFR 172.700 through 172.704. FS and OAS will provide this training upon request.

4.1 **General Information**. Includes all liquid fuels except those under compression (propane, butane, etc.). Fuel containers and packaging should be constructed to meet the specifications of DOT (49 CFR 173) and marked with "DOT Flammable Liquid" warning labels. Fuel containers should be filled to a level, which allows for fuel expansion and never filled beyond rated capacity. Filler containers should be used only as a last resort when other types of containers are not available.

4.2 **Requirements**. To transport liquid fuels in containers of 55-gallon capacity or less, the following conditions must be met:

A. Containers must be specifically designed to carry fuel and of sufficient strength to prevent leakage during transportation and handling.

B. Containers must be labeled with the descriptive name of the fuel and marked "This End Up" or "This Side Up."

C. Containers must be secured in the upright position by tiedown straps or shipped in an outside container that will keep the inner container upright.

D. Batteries, battery fluids, oxidizers, and explosives shall not be transported in a position that allows them to interact with liquid fuels in the event of leakage.

E. Fuel containers that may release fuel vapors must not be transported in unvented aircraft compartments (an unpressurized cabin may be used when it is ventilated to prevent accumulation of harmful vapors).

F. Fuel shall not be transported in plastic or glass containers unless they are specifically designed for that purpose.

G. Additional requirements apply to the following containers:

1. **Safety Cans**. Safety cans must be transported in vented compartments, secured in the upright position, and filled to a level which prevents spillage.

2. **Plastic Fuel Containers**. Plastic fuel containers must not be filled beyond their rated capacity. Do not store fuel in unvented containers at temperatures above 90 degrees F.

3. **Explosafe Containers**. Explosafe containers must not be filled beyond their rated capacity. Containers with screw type vents must be firmly closed while being transported.

4. **Military Jeep Cans (3A2 Jerrycans)**. Military Jeep cans must be secured in the upright position and have one inch of air space below the container opening.

5. **Filler Containers.** Filler containers must be protected by outside packaging and marked "Do Not Drop". Filler containers must have at least two inches of air space at the top of the container.

6. **Sigg Bottles.** Sigg bottles must not be transported with a pouring spout in lieu of an unvented cap and must have one inch of air space below the container opening.

4.3 **Bulk Fuel Containers**. Any fuel container in excess of 55-gallon capacity will be considered a bulk fuel container. Fuel may be carried in bulk fuel tanks if the tanks are installed in accordance with the applicable Federal Aviation Regulations and approved by FS or DOI. Sealdrums (Rollagons) of capacity up to 500 gallons are acceptable for carrying fuel in aircraft.

4.4 **Fuel in Powered Equipment Tanks**. Fuel may be carried in the tanks of powered equipment when the following conditions are met:

A. Powered equipment is secured in an upright position.

B. Each fuel tank is filled in a manner that will preclude spillage of fuel during loading, unloading and during flight.

C. The compartment in which the equipment is loaded must be ventilated to prevent the accumulation of fuel vapors and must not contain an exposed battery.

4.5 **Purging of Fuel Tanks**. Liquid fuel-powered equipment may also be transported on aircraft when the fuel tanks are purged of fuel. The following is an example of mechanical purging of a chain saw fuel tank:

1. Drain fuel tank.
2. Run saw until it stops.
3. Attempt restarting with choke on until saw fails to fire.
4. Remove fuel tank cap and invert saw for 5 minutes.
5. Replace cap.

5.1 **General Information**. Petroleum oils may produce flammable vapors when heated and should be kept away from heat sources. Petroleum oils should be transported in outer containers.

5.2 **Requirements.** To transport petroleum oils on aircraft, the following conditions must be met:

A. Oils must be carried in leak-proof containers specifically designed to carry liquid fuels or oils. The container or outer container must be of sufficient strength to prevent leakage during transportation and handling.

B. Containers with screw-on caps must be secured in an upright position by tiedown straps or shipped in an outside container that will keep the inner container upright.

C. Oils will not be transported in plastic or glass containers unless they are specifically designed for that purpose.

D. Batteries, battery fluids, oxidizers, and explosives shall not be transported in a position that allows them to interact with petroleum oils in the event of leakage.

6.1 **General Information**. Includes fusees, flares and other flammable solids designed for signaling, fire ignition or fumigating. Fusees and flares should be carried in original shipping containers whenever possible.

6.2 **Requirements.** To transport fusees and flares in aircraft, the following conditions must be met:

A. All fusees must be packaged in a container, box, or pack.

B. Broken fusees and those with protective igniter caps removed shall not be transported in aircraft. Fusees prepared for an aerial fusee gun are not required to have protective igniter covers.

C. Fusees with spikes must be transported in strong wooden or fiberboard boxes and have reinforced ends to prevent penetration of spikes through packaging.

D. Batteries, battery fluids, and explosives shall not be transported in a position that allows them to interact with fusees, flares, and other flammable solids in the event of leakage.

7.1 **General Information**. A battery is a device for generating an electrical current by a chemical reaction. Wet-cell batteries contain a fluid of electrolyte acid or alkaline solution. This fluid is corrosive and is a hazardous material. A wet-cell battery case without the fluid is referred to as an empty storage battery or dry-storage battery and contains no hazardous material. The following procedures are recommended:

A. Use dry cell or nonspillable wet-cell batteries.

B. Use spill-resistant caps on wet-cell batteries.

C. Transport batteries and battery fluids in the manufacturer's original shipping containers. If original containers are not available, package in a wooden or fiberboard box lined with a strong plastic bag.

7.2 **Requirements**. To transport batteries and battery fluids in aircraft, the following conditions must be met:

A. All batteries, regardless of type, must be protected from short-circuits by nonconductive terminal caps, tape, covers, or containers.

B. Wet-cell batteries must be packed in nonconductive containers or palletized and have a slip-on cover of nonconductive material.

C. Spillable wet-cell battery containers must be marked "This Side Up" or "This End Up" and secured in an upright position. Orientation markings must be placed on two opposite sides of the package.

D. Metallic items will not be packaged in the same container as a battery.

E. Battery fluid is limited to five gallons per package and must be secured in an upright position by tiedown straps or placed inside an outer container that will prevent the package from overturning.

F. Flammable liquids, flammable solids, oxidizers, and explosives shall not be transported in a position that allows them to interact with batteries and battery fluids in the event of leakage.

8.1 **General Information.** When transporting explosives on aircraft, water gels and two-component explosives are preferred. Detonating materials and explosives should be carried on different flights or segregated using separate compartments or packaging that prevents the interaction of the two materials. The most hazardous material should be transported by external sling load and be accessible for jettisoning.

8.2 **Requirements**. To transport explosives by aircraft, the following conditions must be met:

A. All explosives must be prepared, packaged, and transported under the control or direction of a licensed and certified blaster who is approved by DOI or FS.

B. High explosive must not be transported in the same container as detonators or detonating materials.

C. Flammable liquids, flammable solids, compressed gases, oxidizing compounds, batteries, and battery fluids shall not be transported in a position that allows them to interact with explosives in the event of leakage.

D. Only personnel necessary for the completion of the mission will be allowed on a flight transporting explosive materials.

E. Flights transporting high explosives will not be conducted over densely populated areas or in congested airways. During the approach and landing phase, when under radar control, the aircraft operator shall request appropriate vectors to avoid heavily populated areas. Whenever explosives are transported and a danger exists to people on the surface, advance permission must be obtained from the airport owner or manager when operating on attended airports.

F. Thermite grenades will remain in the original outside shipping containers while in transit. Any unused thermite grenade that has been removed from its inside sealed canister will be returned to the inside canister, repacked and closed in the original outside shipping container prior to loading aboard the aircraft.

G. No aerial dispensing of an explosive device will be conducted unless the dispensing method and/or dispensing device has been approved by FS or OAS.

H. All packages containing explosives must be labeled on the outside of the package with the appropriate DOT Hazardous Materials warning label.

9.1 **General Information**. Includes liquid fuels under compression (propane, butane, etc.), aerosol containers, air, oxygen, carbon monoxide, carbon dioxide, acetylene, methane, helium, nitrogen and hydrogen. Irritants such as tear gas and bear repellant should be transported in an external compartment whenever possible.

9.2 **Requirements**. To transport compressed gases and liquids in aircraft the following conditions must be met:

A. Except for aerosol containers, compressed gas cylinders must be labeled on the outside with the appropriate DOT Hazardous Materials warning label.

B. Containers with gases and liquids under compression must be securely fastened, preferably in an upright position.

C. When carrying compressed gases and liquids internally, adequate ventilation must be provided to prevent the accumulation of harmful vapors.

D. Compressed gases or liquids shall not be dispensed or used inside the aircraft during flight, except for fire extinguishers, oxygen or air, and compressed gases for infrared cameras.

E. Except when dispensing compressed gases and liquids during flight, cylinder valves must be protected from damage by a cap, collar, outer container, or recess in the container.

F. Aerosol containers must be packaged in an outer container or pack. Irritants such as bear repellent or tear gas, carried within the cabin of the aircraft, must be carried in a separate sealed container.

G. Oxygen containers must not be stowed or used in a manner that allows oxygen to come into contact with flammable liquids.

H. Explosives shall not be transported in a position that allows them to interact with compressed gases in the event of leakage.

10.1 **General Information.** Includes ammunition for pistols, rifles, shotguns and similar firing devices.

10.2 **Requirements**. To transport small arms ammunition in aircraft, the following conditions must be met:

A. A person required to carry a firearm, while performing official government business, may carry ammunition for small arms in a readily accessible manner.

B. Loaded weapons will be transported in aircraft only when the mission dictates their use in flight or soon after landing.

C. Small arms ammunition for personal use may be carried on aircraft if contained in original package or box.

11.1 **General Information**. Liquid nitrogen containers should be packed in an outer vented container constructed of wood, fiberboard, metal, or fiberglass. Liquid nitrogen should not be transferred in flight while personnel other than crewmembers are aboard. Avoid open transferring of liquid nitrogen from one container to another container during flight. Use closed system transfers whenever possible.

11.2 **Requirements**. To transport liquid nitrogen in aircraft, the following conditions must be met:

A. Liquid nitrogen must be carried in shatterproof, vented, and insulated containers. Vented or loose-fitting lids are permitted.

B. Containers must be secured in an upright position during transport.

C. Infrared operators must wear personal protective equipment for eyes, hands and body while transferring liquid nitrogen from one open container to another container during flight.

12.1 **General Information**. Includes helitorch and plastic sphere dispensers that may contain flammable liquids and oxidizers such as potassium permanganate.

12.2 **Requirements**. To transport aerial ignition devices in aircraft, the following conditions must be met:

A. The transportation and operation of aerial ignition devices must be under the supervision of a person approved by the FS or DOI.

B. Except for the training of aerial ignition personnel, no personnel other than that necessary for dispensing materials will be allowed aboard the aircraft during aerial ignition operations.

C. Explosives, flammable liquids, flammable solids, batteries, and battery fluids shall not be transported in a position that allows them to interact with oxidizers (potassium permanganate) in the event of leakage.

Definitions

Cargo Aircraft Only. An aircraft restricted to transporting cargo and not engaged in carrying passengers.

Explosafe Containers. Explosafe containers are fitted with a protective mesh designed to prevent containers containing volatile liquid and gasses from exploding.

Filler Containers. Most filler containers are lightweight, box-shaped containers similar to those containing turpentine found in paint stores. The containers, which are often labeled "Gasoline"--"Filler", come in one to five gallon sizes and have a plastic vent cap on top

Fusee. A fusee is a device designed to burn at a controlled rate for signaling, fire ignition or fumigating purposes. It is not a fuse that is used to carry flame and detonate an explosive. A fusee consists of a pasteboard or fiber tube containing a chemical mixture and some type of igniter cap or fuse.

Hazardous Materials. A substance or materials which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety and property when transported in commerce.

Hazmat Employee. As defined in 49 CFR 171.8 is a person who is employed by a Hazmat employer and who in the course of employment directly affects hazardous materials transportation safety. This term includes an individual, including a self-employed individual, employed by a hazmat employer who, during the course of employment:

1. Loads, unloads, or handles hazardous materials;

2. Manufactures, tests, reconditions, repairs, modifies, marks or otherwise represents containers, drums or packaging as qualified for use in the transportation of hazardous materials;

3. Prepares hazardous materials for transportation;

4. Is responsible for safety of transporting hazardous materials; or

5. Operates a vehicle used to transport hazardous material.

Oxidizer. Material that may, by yielding oxygen, cause or enhance the combustion of other materials.

Safety Cans. These are vented fuel containers with self-closing caps, which may release fuel vapors

Sigg Bottle. These containers are round aluminum fuel bottles designed to transport fuel and other liquids for backpacking and other recreational use.

Abbreviations

A.	CFR	Code of Federal Regulations
B.	DM	Department Manual
C.	DOI	U.S. Department of the Interior
D.	DOT	U.S. Department of Transportation
E.	FS	U.S. Forest Service
F.	FSM	Forest Service Manual
G.	HAZMAT	Hazardous Materials
H.	OAS	Office of Aircraft Services